Regarding point V

Reasoned statement as regards novelty, inventive step and industrial applicability; citations and explanations in support of this statement

Technical field

The invention relates to a device for reducing the phase noise of a signal coming from a quasiperiodic source of fundamental frequency f_0.

Prior art

Document WO 02/065631A (= D1) discloses an oscillator which includes a feedback system for reducing the phase noise, comprising a phase-shifting filter and a feedback loop.

Problem

The problem is how to reduce the short-term phase noise of the quasiperiodic signal.

Solution

The phase noise reduction device comprises a physical system of transmitting pulses by transfer of quasiparticles, especially fluxons, in a Josephson transmission line, said quasiparticles having a mutual repulsive interaction. This physical system is defined so as to have a characteristic frequency f_c defining an operating frequency range of the device with a low limit dependent on said characteristic frequency. For the quasiperiodic signal applied as input, this physical system delivers pulses with the fundamental frequency f_0 as output.

Novelty and inventive step

None of the documents cited in the search report discloses or suggests a device that uses such a physical system of transmitting pulses by particle transfer in order to achieve a reduction in phase noise.

The article by Kaplunenko in Appl. Phys. Lett. 66(24), 1995, 3365-3367 (= D2) describes a superconducting circuit based on a Josephson transmission line in which two fluxons generated by applying two input pulses propagate along this line. A repulsive interaction between the fluxons can result in spatial redistribution in the line which results, as output, in a time interval separating the two pulses that differs from that observed at the input of the line. To avoid this interaction problem, D2 recommends designing the line so that the time separation between two fluxons is not less than $3/f_c$. D2 neither discloses nor suggests the

use of a Josephson transmission line for filtering of the white noise of a signal coming from a quasiperiodic source.
US 5 963 351 A (= D3) discloses a clock recovery circuit comprising at least one Josephson transmission line. D3 makes no mention about white noise or its reduction.
EP 0467104 A (= D4) discloses an electronic clock comprising a Josephson junction connected in parallel to a resonant circuit comprising a Josephson transmission line. To reduce the phase noise, it is proposed to apply a phase locking circuit, but this has nothing to do with the present transfer of quasiparticles.
The other documents cited in the search report are even further removed from the device defined in claim 1.

Consequently, the subject matter of claim 1 is novel and involves an inventive step over the cited documents. Claims 2 to 19 also meet the criteria set out in Article 33 PCT, because they depend on claim 1.

Observations relating to clarity (Article 6 PCT)

1. In the definition of the operating frequency range (cf. Cl. 1), the fundamental frequency f_0 is not clearly included. It is therefore not clear whether the terms "operating frequency" and "fundamental frequency" are the same or not. Consequently, the upper limit of the frequency range is not defined in claim 1, contrary to what Article 6 PCT requires (cf. page 8, lines 30 to 33 of the description).

2. The term "particle transfer" in claim 1 has no basis in the description, in which only the transfer of quasiparticles (flux quanta, vortices, etc.) are disclosed.